UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 31516

CR 441

OVER THE

MISSISSIPPI RIVER

DISTRICT 1 - ITASCA COUNTY

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 5221 (CEI 8A)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 31516, Piers 1, 2 and 3, were found to be in good to satisfactory condition with no defects of structural significance. The corrosion and rust nodules observed on the steel piles have resulted in minimal section losses and have not compromised structural integrity; however, the overall amount of corrosion has increased since the last inspection. The channel bottom around the substructure units appeared stable and relatively unchanged; however, minor scour depressions have developed around all the piles of Pier 2 since the previous inspection.

INSPECTION FINDINGS:

(A) The steel pipe piles exhibited 100 percent coating failure from 8 feet above the waterline to the mudline with 50 to 100 percent nodular corrosion. The rust nodules were 1/4 to 1/2 inch in diameter typically and up to 1-1/2 inch in diameter on Piers 2 and 3.

(B) From 4 feet above the waterline down to the waterline at all pier piles there was moderate corrosion with rust delaminations and pitting from 1/16 to 1/8 inch in depth. There was a minimal loss of section with pitting that was typically 1/32 inch to maximum of 1/16 inch in depth from the waterline to the channel bottom.

(C) All piles at Pier 2 exhibited minor scour pockets ranging from 1 to 2 feet in depth and from 1 to 2 feet in radius. At the upstream end of Pier 2 there was a scour pocket 3 feet deep with a 5 feet radius.

(D) A moderate accumulation of timber debris was observed at the upstream nose of Pier 2 and a light accumulation of timber debris was present at the upstream end of Piers 1 and 3.

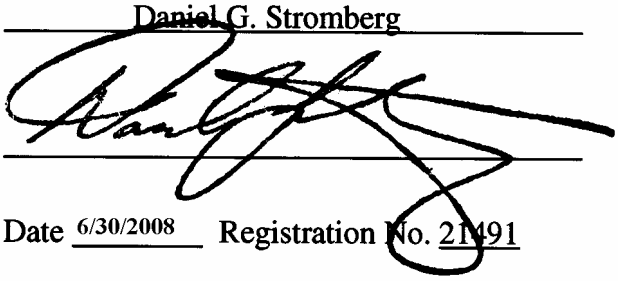
RECOMMENDATIONS:

(A) Monitor timber drift accumulations, and if found to be progressing (to an excessive extent in the future), removal may be warranted at that time.

(B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

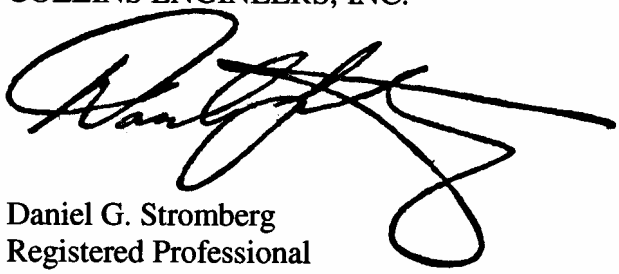
Daniel G. Stromberg



Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 31516

Feature Crossed: The Mississippi River

Feature Carried: TWP No. 273

Location: District 1 - Itasca County

Bridge Description: The superstructure consists of four spans of prestressed concrete beams supporting a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and three steel pipe pile piers. The piers are numbered 1 through 3 from west to east across the bridge.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg
State of Minnesota, P.E., No. 21491

Dive Team: John Loftus, Valerie Roustan

Date: August 28, 2007

Weather Conditions: Partly Cloudy, ± 68 °F

Underwater Visibility: ± 4 Feet

Waterway Velocity: ± 1.5 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1, 2, and 3

General Shape: Piers 1 and 3 are made up of a single line of 10 steel piles. Pier 2 consists of two pile lines of 7 piles each.

Maximum Water Depth at Substructure Inspected: Approximately 5.0 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap on the south end of Pier 1.

Water Surface: The waterline was approximately 22.1 feet below reference.
Assumed Waterline Elevation = 77.9.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 6

Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/08/07

Item 113: Scour Critical Bridges: Code N/96

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

_____Yes X No

Photograph 1. Overall View of Structure, Looking South.

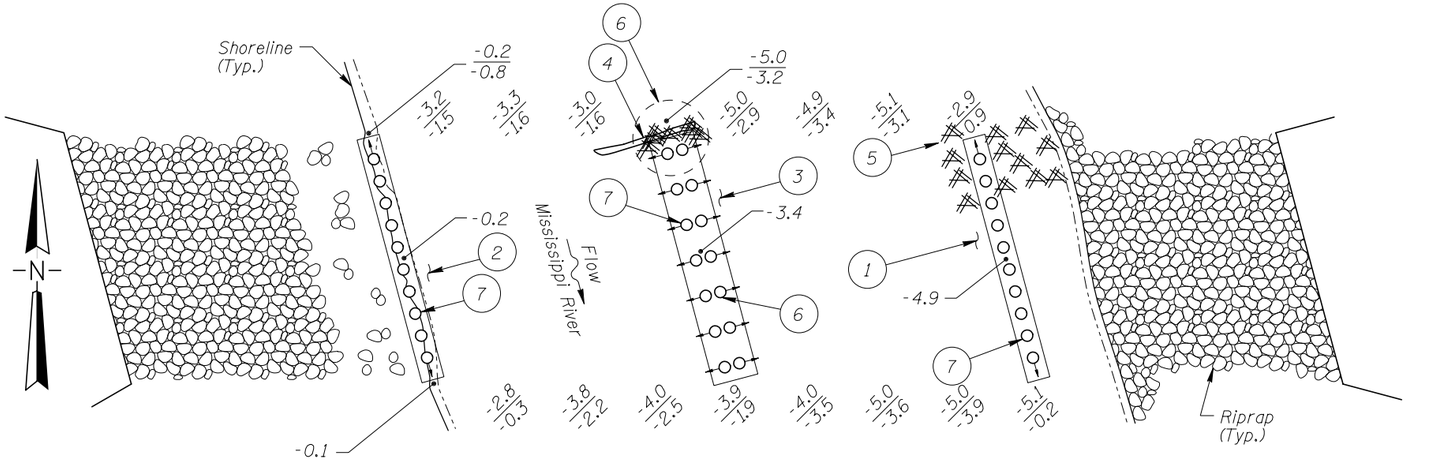
Photograph 2. View of Pier 1, Looking Northwest.

Photograph 3. View of Pier 2, Looking Northwest.

Photograph 4. View of Pier 3, Looking Northeast.

Photograph 5. View of East Embankment looking Northeast.

Photograph 6. View of West Embankment looking Southwest.



GENERAL NOTES:

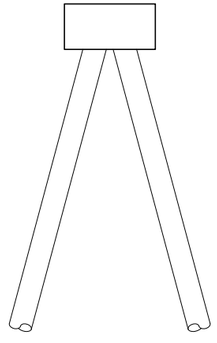
1. Piers 1, 2, and 3 were inspected at this bridge.
2. At the time of inspection on August 28, 2007, the waterline was located approximately 22.1 feet below the top of the cap at the south end of Pier 1. Since insufficiant bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 77.9.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

SOUNDING PLAN

INSPECTION NOTES:

1. The channel bottom material consisted of firm sandy gravel with cobbles and 1 foot diameter riprap and 2 to 3 inches of probe rod penetration.
2. The channel bottom material consisted of silty sand with cobbles and scattered riprap.
3. The channel bottom consisted of silty sand with up to 1 foot of probe rod penetration.
4. Moderate accumulation of up to 1 foot diameter timber debris from the channel bottom to waterline. Also a 2 feet diameter log across both upstream piles of bent 2 that extends off to the West of Pier.
5. Light accumulation of timber debris consisting of 6 inch diameter and smaller logs and branches from the channel bottom to 2 feet above the channel bottom around upstream piles and mostly along shoreline.
6. Minor scour pockets, 1 to 2 feet deep with 1 to 2 feet radius, were observed at all piles. A upstream end of Pier 2 scour was 3 feet deep and 5 feet in radius.
7. Steel pipe piles exhibited 100% coating failure from 8 feet above the waterline to the channel bottom with 50 to 100% coverage of typically 1/4 to 1/2 inch diameter rust nodules and up to 1 1/2 inch diameter rust nodules from the waterline to the channel bottom of Piers 2 and 3. From 4 feet above waterline to waterline corrosion was moderate with delaminations and pitting 1/16 inch to 1/8 inch maximum in depth. From waterline to channel bottom there was minimal loss of section with pitting that was typically 1/32 inch to maximum 1/16 inch deep.

END VIEW PIERS 1 & 3



END VIEW PIER 2

Legend

-2.0 / -5.2	Sounding Depth (8/28/07) / Sounding Depth (8/23/02)
○	Steel Pipe Pile
○	Battered Steel Pipe Pile
⟨ ⟩	Scour Depression
	Timber Debris

Note:

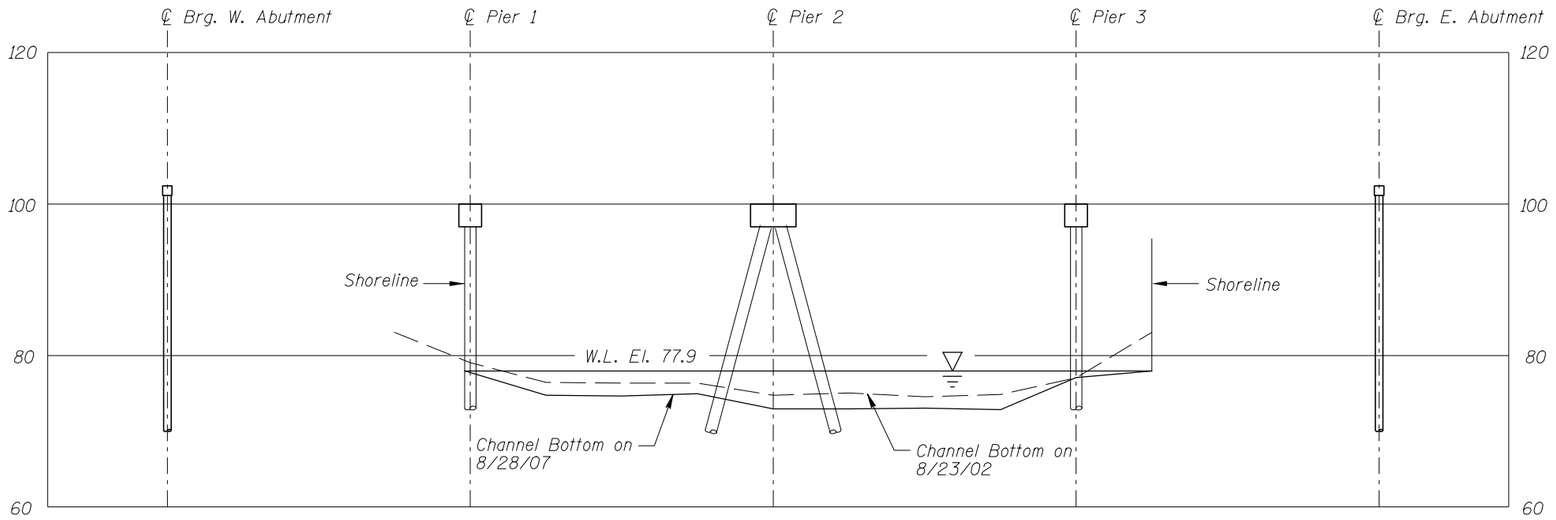
All soundings based on 2007 waterline location.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

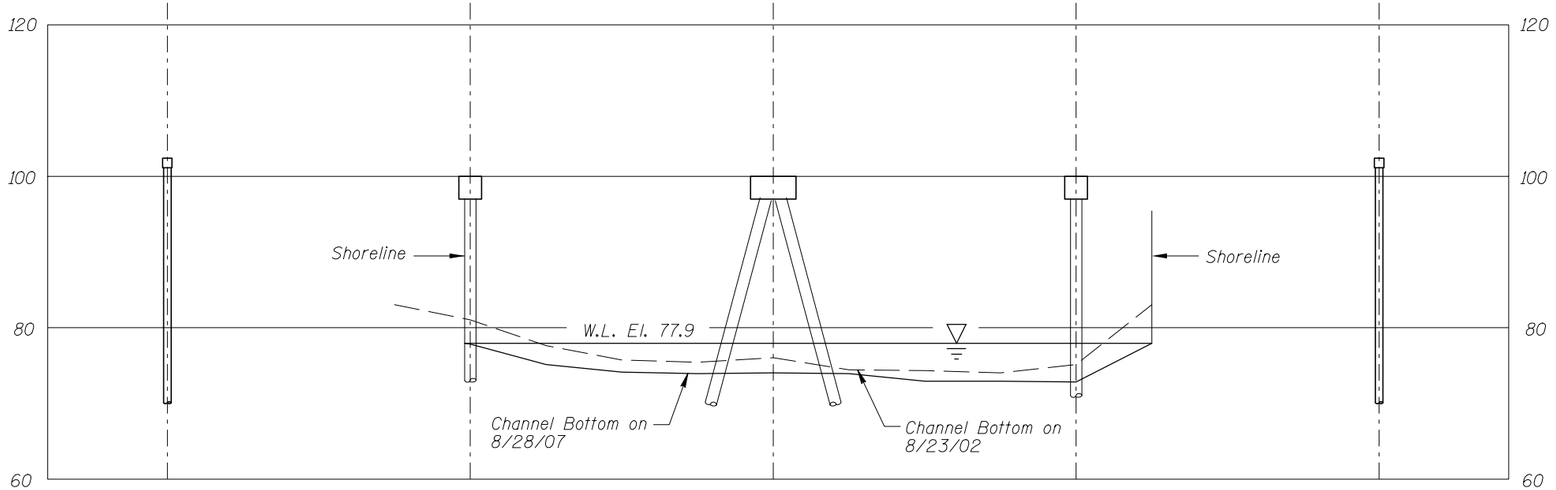
STRUCTURE NO. 31516
OVER THE MISSISSIPPI RIVER
DISTRICT 1, KOOCHICHING COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: PRH	COLLINS ENGINEERS 123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: AUGUST, 2007
Checked By: MDK		Scale: NTS
Code: 5221008A		Figure No.: 1



NORTH FASCIA PROFILE
Vertical Scale: 1"=20'-0"



SOUTH FASCIA PROFILE
Vertical Scale: 1"=20'-0"

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 31516
OVER THE MISSISSIPPI RIVER
DISTRICT 1, KOOCHICHING COUNTY

NORTH AND SOUTH
FASCIA PROFILES

Drawn By: PRH	COLLINS ENGINEERS 123 North Wacker Drive Suite 300 Chicago, Il. 60606 (312) 704-9300 www.collinsengr.com	Date: AUGUST, 2007
Checked By: MDK		Scale: NTS (U.O.N.)
Code: 52210088		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: August 28, 2007

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E., S.E.

BRIDGE NO: 31516 WEATHER: Partly Cloudy, ± 68 °F

WATERWAY CROSSED: The Mississippi River

DIVING OPERATION: X SCUBA _____ SURFACE SUPPLIED AIR

_____ OTHER

PERSONNEL: John Loftus, Valerie Roustan

EQUIPMENT: Scuba, U/W Light, Scraper, Sounding Pole, Lead Line, Probe Rod, Camera

TIME IN WATER: 11:30 A.M.

TIME OUT OF WATER: 12:00 P.M.

WATERWAY DATA: VELOCITY ± 1.5 f.p.s.

VISIBILITY ± 4 Feet

DEPTH 5.0 Feet maximum at Pier 2

ELEMENTS INSPECTED: Piers 1, 2, and 3

REMARKS: Overall, the submerged steel was in good to satisfactory condition with ± 100 percent coating failure and 50 to 100 percent nodular corrosion from 8 feet above the waterline to the mudline. There was minimal loss of section below the waterline with typical 1/32 inch deep to maximum 1/16 inch deep (very infrequent) pitting. Above the waterline there was moderate corrosion with rust delaminations and pitting from 1/16 to 1/8 inch in depth. There was a light accumulation of timber drift from the channel bottom up 2 feet around the upstream piles of Piers 1 and 3 with a moderate accumulation of up to 1-foot-diameter timber debris across both upstream piles with a 2-feet-diameter log extending off (to the West) of Pier 2. There was 1 to 3 foot deep scour depressions around most of the piles of Pier 2.

FURTHER ACTION NEEDED: _____ YES X (*) NO

*Monitor timber drift accumulations, and if found to be progressing (to an excessive extent in the future), removal may be warranted at that time.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 31516
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E. 21491
WATERWAY CROSSED The Mississippi River

INSPECTION DATE August 28, 2007

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	0.2’	7	N	N	9	N	7	8	8	8	8	8	N	7	N	7	N	N
	Pier 2	5.0’	6	N	N	9	N	6	7	N	N	6	6	N	6	N	6	N	N
	Pier 3	5.1’	6	N	N	9	N	6	8	8	8	7	7	N	6	N	6	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the submerged steel was in good to satisfactory condition with ± 100 percent coating failure and 50 to 100 percent nodular corrosion from 8 feet above the waterline to the mudline. There was minimal loss of section below the waterline with typical 1/32 inch deep to maximum 1/16 inch deep (very infrequent) pitting. Above the waterline there was moderate corrosion with rust delaminations and pitting from 1/16 to 1/8 inch in depth. There was a light accumulation of timber drift from the channel bottom up 2 feet around the upstream piles of Piers 1 and 3 with a moderate accumulation of up to 1-foot-diameter timber debris across both upstream piles with a 2-feet-diameter log extending off (to the West) of Pier 2. There was 1 to 3 foot deep scour depressions around most of the piles of Pier 2.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.